



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

AUG 12 1999

MEMORANDUM

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

SUBJECT: Evaluation of an Emergency Exemption Request from California for the Use of Fenhexamid (Elevate™) as a Postharvest Treatment to Control Gray mold Disease on Pears Caused by *Botrytis cinerea* (99-CA-42) (DP Bar codes: D257740 and D257741)

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SUMMARY AND CONCLUSIONS:

California requests the use of fenhexamid on pears as a postharvest treatment to control gray mold disease caused by *Botrytis cinerea*. The maximum amount of fungicide to be used during 1999 will be 1,350 lbs. of product (675 lbs. a.i.) to treat fruits. The fungicide application rate will be 1.5 lbs. of product in 25 gallons of water to treat 200,000 lbs. of fruits.

The fungicides registered for postharvest pear treatment to control fungal decay (including gray mold) include: thiabendazole, captan, BioSave (*Pseudomonas syringae*), Aspire (*Candida oleophila*), chlorine, ozone and sodium o-phenylphenate (SOPP). California claims that the current emergency has arisen due to inadequate efficacy of the registered products in controlling the disease during cold storage of fruits. The state has not provided any documentary evidence. The pathogen was known to have developed resistance against thiabendazole before 1990 but the

yearly losses, caused by gray mold disease, have remained approximately 3.0 percent (2, 3, 4). This may be due to the fact that only 5 -10 percent of the pathogen isolates have resistance against thiabendazole under field conditions (2, 3, 4). In addition, the losses can further be reduced up to 50 percent with a single pre-harvest application of ziram (registered fungicide with a PHI interval of five days) (2, 3). It is also documented that unripened fruits are not susceptible to gray mold decay. Prior to storage, the unripened fruits are washed with chlorinated water, ozonated water and/or SOPP before a fungicide treatment such as captan and thiabendazole to reduce the pathogen population on fruit surfaces. The fruits can also be waxed and heat treated to reduce fungal decay during storage. In addition, the fruit wounds heal during storage (2, 3, 4).

The state has not provided data on the efficacy of registered products (alone or in a combination) in controlling the disease under packing house environment to substantiate its claim of inadequate efficacy of all registered alternatives in controlling the disease. The projected statewide losses of 20% using registered alternatives are excessively high and highly unlikely even under worst a possible scenario. California has not documented a non-routine and /or an emergency event to justify the use of fenhexamide on pears to control postharvest gray mold. *BEAD concludes that the use of fenhexamide is not justified under an emergency exemption to control postharvest gray mold decay on pears.*

THE GRAY MOLD DISEASE:

The postharvest gray mold disease of pears is caused by a plant pathogenic fungus called *Botrytis cinerea*. The fungus overwinters in nature through sclerotia and/or on diseased plant refuse. During postharvest processing, the pathogen may cause an infection through a wound on fruit surfaces and/or through a fruit stem. During storage an infection may slowly grow into a lesion. The fruit wounds generally heal during storage (2, 3). Gray mold is relatively firm decay, and fruit has a dry and spongy feel when squeezed. It is generally recognized that the origin of the spores that cause gray mold is in the orchard. Losses due to gray mold in storage often occur late in the storage season.

REGISTERED ALTERNATIVES:

Fungicides:

Thiabendazole, captan, BioSave (*Pseudomonas syringae*), Aspire (*Candida oleophila*), chlorine, ozone and sodium o-phenylphenate (SOPP) are registered for the control of postharvest diseases (including gray mold) of pears. Ziram is registered for use on pears and can be applied up to a pre-harvest interval of five days to reduce pathogen population on fruits and wound inoculations during harvest.

EMERGENCY AND NON-ROUTINE CONDITIONS:

California claims that the registered fungicides do not provide adequate protection against gray mold disease. The state did not provide documentation of its claim. It is well documented that

gray mold disease causes approximately 3.0 percent yield losses if the harvested fruits are treated with a combination of registered alternatives (1, 2, 3). A pre-harvest application of ziram (a registered fungicide) can further reduce post-harvest losses up to 50 percent by reducing the pathogen population on fruits (2, 3). The EcoScience Corp. failed to detect gray mold pathogen spores in a packing house. It was concluded that fungal spore populations can be significantly reduced by sanitation (Exhibit 4-A of this emergency exemption submission). A sample of 27 isolates in another study showed 63% resistance. The percent population that show resistance against thiabendazole often depends upon sampling and location. If a person samples the pathogen population from a non-sanitized packing house where infected fruits are allowed to remain in its vicinity then the pathogen population having resistance against thiabendazole is usually high. During 1999, Oregon scientists (1, 3) have shown that approximately 5% of 1200 samples of *Botrytis cinerea* were resistant to thiabendazole and the resistant population has not changed since 1984. It is well known in the pear industry that the fruits packed in a non-sanitized packing house often show higher percentage of fruit decay during storage. Therefore, if a few fruit packing houses in California have a slightly higher decay problem then perhaps more stringent packing house sanitation may be the answer rather than an emergency exemption.

BEAD agrees that under artificial inoculations the registered fungicide (thiabendazole) may not be as effective as fenhexamide in controlling the disease. The state has not provided the efficacy data of registered alternatives in controlling the disease under natural packing house environment (without artificial inoculations). A single pre-harvest spray of ziram has been documented to reduce (up to 50 percent) post-harvest gray mold decay of pears (3). The purpose of an emergency exemption is to allow the use of a pesticide on a crop under non-routine and emergency conditions to reduce sudden high crop losses. From the submitted information, data, and experts opinion (1, 3, 4) it appears that California does not have an emergency and a non-routine situation.

Resistant Varieties:

No pear cultivar is resistant to gray mold disease.

Cultural Practices:

Cultural practices, such as crop orchard cleanliness, fruit bin sanitation, changing fruit wash water often, gentle fruit handling, and packing house sanitation plays a significant role in reducing losses caused by gray mold and other postharvest fungal decay (1, 2, 3). The growers should strictly follow these practices rather than heavily relying upon fungicides.

ECONOMIC ANALYSIS:

As discussed above in the biological section, growers of pears in CA are not likely to experience the significant yield and quality losses claimed by CA in 1999 without the requested fungicide. Significant economic losses are not expected using currently available alternative controls.

With the exemption in place for 1999, the income (yield times price minus cost) of pear growers

in CA is projected to remain within its range of fluctuation over the last five years. On the approximately 90,000 tons to be treated, assuming a price of \$648 per ton, a pear crop valued at about \$58.3 million is projected. (See table below.)

In the absence of the requested fungicide to control the mold, expected yields are likely to be higher than the break-even point of about 85 percent of the 90,000 tons to be treated, or 76,500 tons. The value of that resulting pear crop would be greater than \$49.6 million, and it would not create a significant economic impact for growers of pears in CA this year.

1999 CA Pears: With and Without Fenhexamid

Year	Yield (tons)	Price (\$/ton)	Value (\$mil)	Cost (\$mil)	Income (\$mil)
1994	34,346	543	18.6	21.7	- 3.1
1995	27,946	732	20.4	20.4	0.0
1996	33,396	619	20.7	22.0	- 1.3
1997	30,896	629	19.4	19.5	- 0.1
1998	26,446	717	19.0	16.3	2.7
Avg. 1/	30,606	648	19.6	20.0	- 0.4
Break-even 2/	26,080	648	16.9	20.0	- 3.1

Source: Data submitted by the State of California.

1/ With the fungicide: 5-year average.

2/ Without the fungicide: Lowest yield which would produce lowest 5-year income.

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